

Hello Computer: Towards a Research Agenda for Conceptualising “Presence” in Human-Computer Engagement

Michael Seymour

Business Information Systems

University of Sydney

Sydney, Australia

Email: mike.seymour@sydney.edu.au

Ella Hafermalz

Business Information Systems

University of Sydney

Sydney, Australia

Email: ella.hafermalz@sydney.edu.au

Abstract

Technological developments are bringing interactive computer agents, such as Apple’s *Siri*, into our everyday lives and routines. These interactive agents are designed to be the focus of our interactions – we can feel “present” with them. Yet current theories of “presence” in IS do not account for the question of what it means to be present *with* technology in an experiential sense. In response we draw on existential philosophy in order to generate a research agenda for conceptualising presence in the context of what we term *human-computer engagement*. We suggest that research from this new perspective requires focusing on the situated interaction rather than an a-priori assessment of the entities involved. We conclude by considering the ethical questions that emerge when technology is experienced as being an independent agent with which one can be present.

Keywords presence, co-presence, existentialist philosophy, IS theory, interactive agents, conversational avatars

1 Introduction

Information Systems (IS) scholars have demonstrated an interest in the concept of “presence” (Altschuller & Benbunan-Fich, 2013; Riemer, Klein, & Fröbber, 2007; Schultze, 2010). Usually, IS research on presence investigates how people who are not physically co-located can use technology to replicate the experience of being present with another person. To this end, the emphasis tends to be on how technology can facilitate natural communication between two parties who are geographically distant from one another. Terms associated with such research in IS and related literature include *co-presence* (Subramaniam, Nandhakumar, and Baptista John 2013), *social presence* (Sallnäs 2005), and *telepresence* (Li 2015). Presence in such contexts is often theorised as occurring when an “illusion” is created, by technology, in which the brain is tricked into thinking it is somewhere where the body is not (Lee 2004; Lombard and Ditton 1997; Schultze, 2010).

While this literature on presence has played an important role in investigating the experience of historically novel IS phenomena such as virtual work, there is increasingly a need to consider the complexity of how we relate to others in technologically mediated ways. Specifically, in this paper we identify a need to develop IS theories of presence in such a way that we can account for the emergence of technologies such as *interactive computer agents* (e.g. Apple’s Siri), where technology is not only a means for becoming present with another person, but in some circumstances becomes the *focus* of our “presencing” efforts (Hafermalz and Riemer, 2016).

By this we mean that there are technological developments, specifically in the Human Computer Interaction (HCI) domain, where a virtual agent is designed to be a person’s interactant. That is, some new technologies are expected to instil in the human the sense that a conversational agent is *present* with them. Inspired by such emergent phenomena, in this paper we outline an agenda that begins to recognise as a research issue not only presence that is achieved by humans using technology (human-(technology)-human interaction), but also the issue of being-with technology in the sense that one feels present with a technological agent. The research agenda we develop in this paper creates a clearing and conceptual ground from which we can begin to ask the intriguing research question: *what does it mean to be present with technology?*

We don’t provide answers to this question, rather we show why it is important. In building to a conceptual basis that will support the pursuit of the question of human-computer *engagement*, we first offer a theoretical and empirical grounding of existing investigations into the notion of presence in IS and HCI literature. We categorise these investigations and show how borrowing from other domains, specifically existential philosophy, can enrich the current discussion and provide a basis from which to begin researching the phenomenon of being present with technology.

In putting forward a research agenda for the emergent phenomenon of interactive computer agents, we suggest drawing on alternative philosophical and methodological ground, which requires that the researcher does not begin by fixing a-priori what the entities involved in interaction *are*. We propose instead, by drawing on interdisciplinary literature, that starting with the *interaction* between computer and human we are able to focus on a qualitative understanding of presence in emerging research contexts. We argue that by starting with the interaction as the phenomenon of interest, we can then in a sense work backwards and start to understand inductively how this interaction shapes the actors involved. In this sense, we are suggesting a rethinking of conceptual approaches to HCI phenomena.

The paper is structured as follows. We look at the context of presence in IS research and the conventional theories in this area. We explore the issues of human and computer interaction through the lens of two modalities, exchange and engagement. In the exchange mode, we show that it is often assumed that the relationship between two interactants involves a sequential exchange supported by technology. In the engagement mode, we emphasise an involved sense of mutual transformation, where the interaction is primary to the constitution of both parties. We argue that in traditional cognitivist views of presence, technology stands apart from its use. Recognising that there is a contemporary blurring of the lines between human and computer interaction, we argue that there is a need to reexamine our assumptions of the computer as standing apart from interaction. We offer two examples Artificial Intelligence (AI) in email interactions and advanced Augmented Reality (AR) conversational agents or Avatars. We discuss the resulting research agenda and the implications of this reconfigured approach for future research.

2 Context: Presence in Information Systems Research

In much of the research currently published in Information Systems and related fields, such as Computer Supported Collaborative Work (CSCW) studies, “presence” that involves technology is implicitly or explicitly compared with presence that is co-located and unmediated (Al-Ani, Horspool, & Bligh, 2011; Ishii & Watanabe, 2009; Karis, Wildman, & Mané, 2016; Li, 2015; Sallnäs, 2005). We locate in prominent literature in this field an assumption that face-to-face interaction between physically co-located people is the ideal, which technologies are trying to in some way imitate or replicate (e.g. Karis et al., 2016). In such literature, the word “illusion” is frequently used (see definitions in Schultze, 2010) to express how technology can act as a “disembedding mechanism” that is capable of removing the user from time and space, enabling their perceptual transportation into another realm (Majchrzak and Malhotra 2013), where it is possible to interact with other persons.

In the following we argue that such a conceptualisation of presence in IS research comes from a well-founded interest in phenomena such as virtual work. Likely inspired by the coining of the term *telepresence* by Minsky in 1980 (Lee 2004), IS and CSCW theorising has focused on how technology can support the sense in which two people can feel as though they are present *virtually* with one another, even when they are physically *not* present together (Devine & Filos, 2001; Karis et al., 2016). We acknowledge this lineage while also drawing attention to the way in which this theorising carries certain assumptions about what it means to be present together and how technology fits into human-computer interactions. We later consider how these assumptions may get in the way of theorising emergent phenomena in IS and in HCI more specifically. We apply this analysis in the context of the phenomenon of being present with a virtual avatar through interaction.

2.1 Conventional presence phenomena and theorising

Conventional theorising around presence in virtual work literature often conceptualises presence as being the result of a perceptual trick created by technology. This conceptualisation is well illustrated in the following quote from Lombard and Ditton (1997), who defined presence as:

The perceptual illusion of non-mediation [where] the individual can indicate correctly that s/he is using the technology, but at “some level” and to “some degree,” her/his perceptions overlook that knowledge and objects, events, entities, and environments are perceived as if the technology was not involved in the experience.

Underlying this illustrative definition of virtual presence is the assumption that technology supports presence best when it is backgrounded; when it becomes invisible to the user while supporting an illusion of non-mediated interaction.

There are two ways in which technology can show up in this understanding of presence in technologically mediated environments. Either the technology can be imperfect in its rendering of the “illusion” that one is *there with* another person, or it can intrude into the experience (through breakdowns, for example) and thereby spoil the sense of presence that had been achieved through a successful illusory experience. A tension emerges in this conceptualization that relates to Ihde’s (1990) observation that humans often desire what technology can enable, but at the same time wish that this achievement were possible without technology.

In this view of presence, which we broadly label as *cognitivist* (Dreyfus, 2006; Hauskeller, 2012) - because of its emphasis on an illusory split between mind and body - presence is seen as an exchange-based event that occurs through technological intervention between fixed entities. This view does not tend to give weight to differences in how presence is experienced, or how the humans involved in the interaction may contribute to how presence is constructed in practice (for an exception see Riemer, Fröbler, and Klein 2007). There is an established research focus here on bringing a person into a room virtually, but less focus on how the human already in the room enables presence. We contend that this view is not well equipped to consider the variations in how presence is enacted in a variety of contexts, and, as we will now argue, this view potentially restricts our capacity to recognize and begin to theorise what is important about emergent technological phenomena, where technology becomes the *focus* of our interaction rather than the medium through which interactions are conducted.

2.2 Emergent phenomena and new horizons in theorising presence

New technology potentially allows, and perhaps even requires, questioning core assumptions that underpin current approaches to theorising presence in IS. Consider the recent Artificial Intelligent (AI) advances for email. The research area of email is perhaps seen in HCI as mature and a less compelling

area of research, however there are current technological developments in this area that open up new worlds of meaning that might be explored in terms of presence. These include new technologies such as AI agents driving the interaction of emails. In such systems, a non-mediated computer agent is invited into an email discussion to facilitate, in a conversational manner, arranging a meeting.

This development of computer agents that act as virtual assistants offers an example of how there may be a new, qualitatively different development on the horizon that might warrant extending the boundaries of HCI theorising. For example, *Amy Ingram* from *X.ai* is a conversational agent that prompts a reconsideration of how humans and computers interact and how presence is understood. Amy can be thought of as being somewhat like an *Apple Siri* agent for email scheduling. ‘She’ is CC’d on emails and then independently manages appointment scheduling, all through independent natural language emails. This interaction discusses times, availability, scheduling, even suggesting cafes or restaurants to meet at. Using a conversational style, the agent manages a person’s appointments by emailing and answering questions to all parties, as a human assistant would. Amy uses new deep learning AI Scala programming approaches to language understanding. Amy is experienced as if ‘she’ is a subject rather than an object – it is as if technology was not involved in the experience (Syman 2016). Amy is a presence in the exchange but not as a stand in for ‘real’ person, she presents as a new identity.

By independently emailing and scheduling meetings, offering suggested meeting places and answering questions, Amy appears to many users to be ‘real’, even when they know her to be a construct. People have reportedly sent Amy thank you emails and expressed appreciation, providing considerations that one would rationally assume are of little value to a conversational agent (O’Reilly 2015). As an interactive agent, Amy requires no special codes, sign in, passwords or user interface, she is simply CC’d on an email to take over organising the meeting. Such conversational agents do not have physical presence; they are present only in and through their interaction, as there is no other additional embodiment of the agent other than their involvement in the email exchanges. Yet we could assume that for some people, especially those who express their gratitude to her, Amy is experienced as being present in their interaction with her.

This is a somewhat different phenomenon from interacting with a robot, such as Kismet, where the interactive agent’s presence can be understood in terms of physicality. Independence, self-motivated movement, the ability to perform complex tasks (along with other aspects), all figure in a common understanding of a physical robot. However, if a user wears a Virtual Reality (VR) style gear set, which is actually Augmenting Reality (AR)¹ then they can witness a humanoid robot-like character, in the room. Is this avatar present? The avatar can be locked (tracked) to the room, appearing to remain seated opposite the observer. It can be independent in motion, self-motivated in movement and action and could be performing complex tasks such as answering verbal questions. In almost all respects the avatar has presence in the room, just as a robot might, but without any physical mass. As an exemplar, *Microsoft Hololens* or *Magic Leap* technology is being explored to provide such functionality.

These emerging technological phenomena prompt us to question the boundaries of terms we have taken for granted. The presence of an AR avatar or conversational agent is ambiguous when presence is taken to be a stand-in for what is physical, objective, ‘real’. These agents may however instead be understood as being more or less present in terms of their *engagement* with the person they are interacting with. Here, we propose that rather than focus on physical presence, it is a sense of engagement with an interactant that produces the sensation or experience of the avatar being present. It is this phenomenon that we argue is in need of further research attention, and in the following we aim to carve out conceptual space that can support such research in the future.

3 Towards a Research Agenda: Conceptualising Presence

In Figure 1 below we articulate four phenomena that we propose are relevant to HCI research. We start by placing our categorisation in the context of two key attributes: *Types of Interaction* and *Focal Entities*. We explain how it is possible to examine, based on the assumed nature of the interaction between focal entities, either interaction as *Exchange* or *Engagement*. We show that an interaction phenomenon can be considered to occur between humans (mediated or not) or between a human and computer. In the following we explain the kind of phenomena that we envision as relating to each of the four quadrants. We discuss how these phenomena are linked to different conceptualisations of presence, and we show how the 4th quadrant opens up new opportunities for research.

¹ When involving a head set AR is sometimes referred to as MR or Mixed Reality

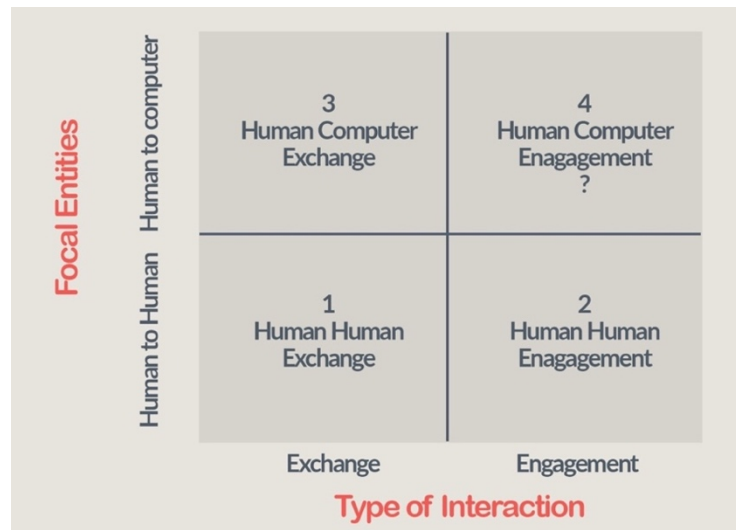


Figure 1: Differentiating Conceptualisations of Presence in HCI Phenomena

3.1 Human-Human Exchange: Presence in IS and CSCW Theorising

Quadrant 1 is characterised by research on the phenomenon of human to human interaction through technology. We argue that this is the phenomenon that much of the IS and CSCW research on presence is concerned with. An example is a research interest in how two people can be present with one another while working together in a virtual team. In such a phenomenon, the focal entities involved in the interaction are human. Technology is meant to support this interaction, in such a way that the technology itself recedes from view. When technology is supporting such an interaction, it should be backgrounded (Ihde 1990). In quadrant 1 phenomena, if you remove the other person there is no presence, and to get it back you have to *mimic* ‘actual’ presence as much as possible. This conceptualisation assumes that the most or ideal presence would be physical co-location in a room.

In research relating to quadrant 1, technology is usually treated as a tool with which the “illusion” of co-presence is created (Schultze 2010). The emphasis then is on the way in which technology, for example email, Skype, or more recently video “portals” between two offices, can *create* presence between people (Karis, Wildman, and Mané 2016). In this somewhat technologically determinist assessment, it is the refinement of technological aspects of the interaction that supposedly leads to an improved sense of presence. For example, presence is seen to be improved through refinement of technical functionality (Dennis, Fuller, & Valacich, 2008) or through the appropriate selection of the medium of communication according to the task at hand (e.g. Daft and Lengel 1986). In such a conceptualisation, presence is seen as something that can be achieved when two separate entities are made to experience an illusion of sharing a common space through a technically supported exchange (Schultze, 2010).

The focus in this research is on how technology creates presence by effectively supporting exchanges between humans. What is often not explored in this way of thinking about and investigating presence is the complex ways in which human relationships form and are expressed and experienced over time. There is for instance little discussion of how presence may be qualitatively different based on who is involved in the interaction. We characterise research that is prototypical of quadrant 1 as emphasising human-human *exchange*. There is an assumption here that a Skype interaction between two strangers would result in the same kind of presence as between two friends who are using the same technologies, because the interaction is conceptualised as an exchange that is context independent. We suggest therefore that a limitation of a quadrant 1 research focus is a perspective which does not fully account for the relational, emotional, and contingent dimensions of human-human interaction and the way in which such dimensions relate to enactments of presence.

In this first quadrant, the assumption has been that presence occurs between two people. Someone is ‘in the room’ and we need to focus research attention on the technology, in order to make a second person who is *not* in the room ‘more present’. But in this sense we are only looking at the second person, not at the contribution or behaviour of the person who is in the room. It is as if the amount of presence the technology can foster is independent of who is taking part. There is an assumption from the outset that presence is the problem and that it is the role of technological design to create presence.

3.2 Human-Human Engagement: Presence in Existentialist Philosophy

Standing in direct contrast to the notion of presence being a simple matter of sharing space is the existentialist notion of presence as a transformative experience of *involvement* between two people. An existentialist understanding of presence draws on the work of Gabriel Marcel (1951, 1965), who has been influential in philosophical conceptualisations of presence, in particular as it relates to holistic nursing theory (Doona et al., 1997).

Important to such an existential understanding is the phenomenological observation that experiencing presence is *not* the same as sharing space or even communicating with another person. Marcel (1965) explains that one can sit opposite someone and feel far away not only from the other person but also from oneself, and yet one can feel very close to a friend who is geographically far away. Marcel (1951) infers that human interaction as presence is comprised of more than physical co-location, and that presence, while hard to define, relates to a kind of *involvement* or engagement that is mutually constituted. Presence is in existential philosophy understood as something that is felt between two people in a way that is transformative for those involved (Doona et al., 1997).

Inversely, co-located interactions between people can occur *without* presence, and these interactions are a kind of *mere* exchange that can result in a feeling of alienation:

If another person is not 'present' to us, something essential is lacking. Communication without communion means that 'the other' understands what I say to him, but he does not understand me. This stranger interposes himself between me and myself; I am not really myself while I am with him (Marcel, 1951 pp. 205–6).

This experience of communicating with someone while feeling that they or oneself are not really *present* in the interaction is likely familiar to the reader. Yet dominant theorising of presence in IS does not account for this sense in which interaction as mere *exchange* is not the same as an involved interaction that is characterised by *engagement*. For this reason, we suggest that quadrant 2 theorising, which recognises the existential aspects of presence and explores the richness of the phenomenon of human-human interaction offers a useful complement to current dominant approaches to conceptualising presence in IS and HCI.

While we recognize the important contributions that quadrant 2 research has to offer to a more nuanced understanding of the relational aspects of presence, we also recognize that the technological aspects of how human-human interaction is carried out and experienced today are at this time largely absent from this body of research. For example, quadrant 2 work on conceptualizing presence is mainly found in literature on nursing, where presence is seen as a form of care between nurse and patient (Doona et al., 1997). This literature is however currently focused almost entirely on non-mediated human interaction (for an exception see Tuxbury 2013 for a pilot study on experiences of presence in telenursing). We see potential for further interdisciplinary work in this quadrant, and also believe that this quadrant has much to offer researchers grappling with questions that we suggest are provoked by quadrant 4 phenomena.

The focus of quadrant 2 research is presence as a form of engagement between people. In contrast, in the following two quadrants we explore interactions between a person and *technology*, not in the sense of an avatar or symbol of a human operator, rather in the sense that it is the technology itself with which the exchange and engagement occurs. We characterize the following two quadrants as being concerned with what it means to be present with technology.

3.3 Human-Computer Exchange: Presence in HCI Theorising

In this third quadrant, we recognise research that has been concerned with human-computer interaction, where the human and computer are from the outset cast as two unique entities that interact through the *exchange* of information in a sequential way. Research in this quadrant has focused on what it takes for a computer and human to essentially 'read' one another in a way that is predictable and again, as in quadrant 1, not dependent on contextual or relational factors.

In this third quadrant, the common thinking is still that of the computer and the human standing apart. The conventional model of computer and user interface for example separates the machine from the user. Both are seen as separate objects. In HCI models such as that shown in Figure 2, it is stated that there is a user and a machine each with a private and public aspect. The machine has a user model $u(m)$ and the user a mental model $m(m)$. The shared space of each is *given* or *told* to the other. In this view there are two separate objects with internal and public aspects, and even the notion of a programmer is included with their model and assumptions of the stereotype (their internal model). In this model the

shared can be known, but while the machine is knowable in theory, in practice either the code is so complex as to make it almost unknowable or the machine model encompasses modern AI approaches of deep learning and complex decision forests which are learnt and self-constructed, and ultimately unknowable. On the user side, the private is not knowable as a user may not be knowable to themselves.

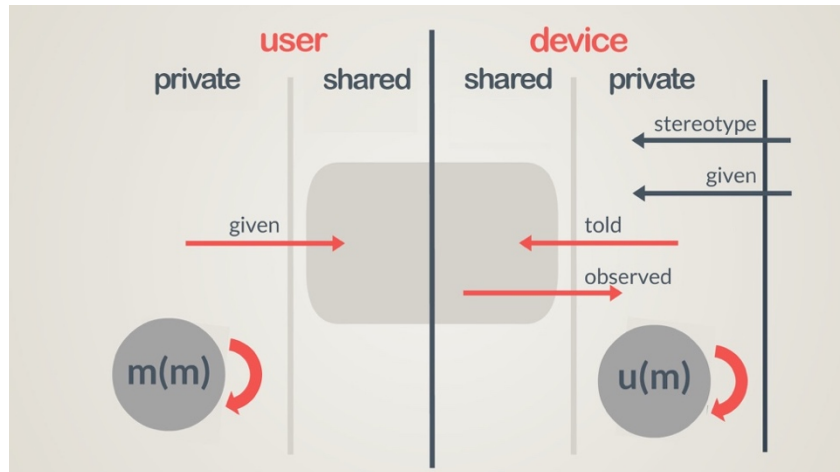


Figure 2: Human Computer Exchange (adapted from Suchman, 1989)

It is unclear what role presence plays in these cases, where the user and the machine are seen as having states which are observed and given. One is seen as reacting to the other, based on their internal models. The *interaction* is implied at the divide between user and machine. Even the labels, as (Suchman 2007) later points out, assume predefined and constant roles: the term ‘user’ sets up a particular role and relationship to the machine. This can be characterised as interaction displayed in terms of a model of a cooperative system interacting with a user (Kay 1994). The machine aims to interpret the private user intent with the shared user-given information. The interaction is seen as being defined as a response to what is observed. In such an exchange based conceptualization of interaction, there is little room for the transformative aspects of presence that were highlighted as being central to quadrant 2.

The exchange based human-computer model is the basis of a body of recent HCI theorising, even in areas that involve emotion such as Affective Computing (Picard 1997). In this framework, the assumption is made that the user has an emotional state and that this is revealed by shared means and observed by the computer which then may change state based on the observation and its internal $u(m)$. An emotion is also able to be told by the computer to the user who may then change their emotional state based on what was told. Again, we point out that the notion of mutual transformation or even mutual constitution, implied in an existential understanding of presence, is lacking in these conceptualisations and that therefore there is opportunity to reconsider how we might approach human-computer interaction phenomena.

The limitation of the conceptualisation of presence illustrated in quadrant 3 is that the interaction is assumed to be reactive and state based between two entities that are knowable outside of their relation to one another. Even with the emotional nature of Affective Computing, emotion is assumed to be the property of either the current user state or the current computer state. The interaction itself is not seen to be emotional. The interaction is not *joyful*, *happy* or *annoying*. Rather the user is assumed to be happy or joyful. In this model, the interaction is seen as the medium through which both sides communicate. A view expressed by (Bødker 1987) is that the UI becomes the connective medium, and people work “through the interface”. The focus here is on understanding the intent of objects, which are viewed as interacting through an interface. There is however not a focus on making sense of the interaction itself.

3.4 Human-Computer Engagement: Towards an Existential Understanding of H-C Presence

In order to begin to more sensitively account for the emergent interactive phenomena discussed at the outset of the paper, we bring together two ideas to inform a research agenda characterised in quadrant 4. First, we consider the phenomenon of interaction where the *focus* of the interaction is not another human, but the computer itself. Ihde (1990, p. 97) defines this type of interaction with technology as “alterity relations”. The important point in alterity relations is that technology becomes the focal point of interaction, not as a list of properties or object characteristics, but rather as a complete “other”. To account for such an interaction, according to Ihde (1990, p. 98), we need to conduct “an analysis of the

positive or presentational senses in which humans relate *to* or with technologies, to technology-as-other”.

Once we accept that technologies such as interactive computer agents are increasingly emerging as “focal entities that may receive the multiple attentions humans give the different forms of the other” (Ihde, 1990, p. 107), it then becomes possible to consider what an existential understanding of presence brings to a conceptualisation of such interactions. The second idea that we here bring to bear on quadrant 4 is thus a consideration of how presence is conceptualised. We borrow from existentialist philosophy an understanding of presence as involvement or *engagement*, in order to prompt a consideration in future research of what this understanding offers to a conceptualisation of presence between human and computer-as-other.

We contrast a quadrant 4 conceptualisation of human-computer *engagement* to traditional accounts of human-technology interaction, in which technology only becomes visible or noticeable when it breaks down (Ihde, 1990). The complexity comes when trying to embrace how the interaction itself changes the relationship between, and even the nature of, interactants. The Media Equation (Reeves and Nass 1996) showed how people can favour their devices as a result of interaction. In a study by Nass and Yen (Nass and Yen 2010), subjects scored a routine software evaluation more favourably when reviewed on their own laptop than when they reviewed on a third party’s computer. The reason is related to anthropomorphising their own devices. In this phenomenon the u(m) has no emotional design or intent from the programmer, it is not trying to be emotionally engaging, but through the interaction the user changes their attitudes to the computer. Over time, by interacting, a person can develop a relationship with a technological device.

We further draw attention to situations where technology is the *intended focus* of interaction. Interactive computer agents such as Amy or Siri are for example entirely computer operated and do not appear in physical embodied form, however they are in many ways designed to interact with humans as *subjects* rather than objects. In this final quadrant we make space for addressing this phenomenon. We specifically wish to raise as an area for future research the critical consideration of whether and how one experiences a sense of presence with technology in such interactions. True presence, in the existential sense, is a form of involvement where both parties are available to one another and open to a kind of transformation that occurs in being present together. Where presence fails, the self is experienced as an object, because it is treated as an object by the other (Marcel, 1965). This existentialist understanding of presence resonates with Ihde’s (1990) notion of alterity relations, in that this understanding takes seriously how interaction is more than a quantifiable or predictable exchange and instead involves a situated *engagement* that is constitutive of an interaction, and, to an extent, serves to shape the identities of those involved. What this looks like between a human and computer is the phenomenon that we argue needs further attention.

In order to conduct an investigation in the spirit of quadrant 4, we suggest treating the interaction between human and computer as the significant starting point, rather than a focus on state machines of a user or machine model. The research possibilities become clear when we consider investigating deliberately emotionally engaging H-C interactions such as those introduced between a user and the interactive email agent, Amy.² Interfaces such as photo real conversational agents may be able to be more richly explored if observations of presence are not approached from the dualist state-machine model perspective and instead from an existentialist perspective, where we take the interaction as primary. With the advent of much more complex and nuanced interactions between computers and humans, a more open stance that explores the experiential and qualitative aspects of interaction, in terms of presence, opens up new territory for HCI research. By starting with the interaction as our focus, we can explore how this characterises the computer and human involved in the interaction.

4 Discussion

There is a broad spectrum of ways in which people interact with computers. In IS and other fields, a significant body of research has sought to better understand how humans interact in terms of *presence*, both with and without technology. However, there has been, to our knowledge, little consideration of what it means to be present *with* a technological agent that is not being steered by a human operator. Yet as service industries in particular become increasingly automated, HCI where technology is the *focus* of the interaction is becoming a more prevalent feature of everyday life. This technological development

² We further raise the question of whether the term ‘user’ is appropriate to such an interaction.

calls for a consideration of how we can advance theorising in IS and HCI more specifically by adapting and developing theories of presence to better account for the experience of *being with technology* in a way that goes past a mere *exchange* model and towards accounting for the experience of involvement or *engagement* between humans and technological interactive agents.

While HCI research has typically focused on the entities of ‘human’ and ‘technology’, the emergent phenomena we have described may benefit from a different approach to the investigation of interaction. Rather than focus just on technology as an object that stands apart from interaction, studies of presence in human-computer interaction may benefit from a primary focus on the interaction itself. The qualitative, active, contextual, experiential, and relational aspects of interaction may have a formative influence on the identities of those involved in the interaction. In this sense we are suggesting a consideration of what the term HCI calls for. The HCI emphasis has often been Human, Computer and Interaction - each term existing separately. This conceptualisation has conventionally placed the interaction last in order of research emphasis. Interestingly, anecdotally various academic communities moved from using the older acronym CHI to HCI in an effort to place the emphasis on the *Human* first and the *Computer* second. While we are not suggesting changing the acronym to IHC, we are suggesting a possible rethinking of the approach surrounding this ontology that could disclose new worlds (Spinosa, Flores, & Dreyfus, 1999) for future research.

If we start with the interaction in terms of presence, and see how that renders the machine and the human, what could this tell us about each? Would we see a more symmetrical relationship? The relationship in HCI is currently often understood in terms *us and them*, *humans and the object things*. In taking a more post-human approach (Haraway, 1991; Ramiller, 2015; Suchman, 2007), we suggest starting with the interaction, thereby leaving open the opportunity to theorise what the computer becomes through different experiences of being-with technology. For example, is a particular human-computer involvement akin to companionship? Is the dynamic master/servant? Following on from such questions, these emergent human-computer interactions typical of quadrant 4 phenomena may warrant a consideration of how ethical boundaries change. Is there any real or perceived moral obligation to a virtual assistant? What constitutes ethical treatment or violation of agents such as Amy? When we begin to consider the existential aspects of being-with technology, such considerations become meaningful. Quadrant 4 research is thus charged both with opportunity and a certain responsibility. We argue these are timely and relevant to both the research and practice of HCI.

Conventional approaches to researching human-computer relations start from the assumption that there is this computer object we are building with certain properties and similarly there is a person with certain properties, and that these need to be made to interact through some form of exchange. We suggest that in researching quadrant 4 phenomena, we should openly study the experience of human-computer interaction and explore what the situation itself reveals about the relationship between humans and machines. We may find that perhaps the relationship changes, or that it may have a different quality from what is expected.

Central to this re-imagining of HCI is a questioning of the assumption that physicality is the gold-standard of presence. The boundary between physical and non-physical is imprecise and even more so in the digital world. To quote Haraway (1991, p. 149), contrast the TV sets of the 1950s or the news cameras of the 1970s with the smart phones of today: “Our best machines are made of sunshine” she stated; “they are nothing but signals, electromagnetic waves, a section of a spectrum, and these machines are eminently portable, mobile” and ubiquitous. Even without physical embodiment, people are grateful to their assistant Amy for successfully arranging a meeting for them. Digital projections of similar interactive agents are soon likely to furnish our social worlds while their physicality remains ambiguous. In this paper we argue that an understanding of presence that is based on *engagement* rather than physical existence, co-location, or exchange, is needed before we can begin to grasp the particularities of what it means to be-present-with such technologies.

5 Conclusion

Most people can recall a conversation in which they felt engaged and inversely could describe a time in which they felt that their conversational partner was *not* present. While technology has traditionally been seen as either facilitating or getting in the way of the experience of presence, we are increasingly seeing the emergence of technological agents that are designed to be the *focus* of such interaction. Technology is here the ‘other’ with which we become present. Inspired by this emergent phenomenon, we propose bringing together two worlds – those of HCI and existentialist philosophy – in coming to an

interdisciplinary basis for researching the emerging technological phenomenon of what we have termed *human-computer engagement*.

In this paper, we have argued that in developing a research agenda that can account for emergent phenomena, it is worthwhile to look beyond exchange based understandings of human computer interaction and towards the more nuanced, experientially based work on presence that is inspired by existentialist philosophy. This shift of emphasis is important because it acknowledges that presence is not a uniform experience that can be *created* in a unilateral sense, either by humans or by technology.

We suggest that research into human-computer engagement should begin with a focus on interaction, and specifically how such interactions are enacted and experienced, in terms of presence. This is an alternative approach to the dominant method of deciding a-priori that interaction is an exchange between pre-defined entities. The aim of this research agenda and approach to theorising presence is to open up new areas of inquiry, including a more holistic understanding of the emotional dimensions of human-computer interaction and a consideration of new ways of relating to technology. We also acknowledge that this approach brings with it a consideration of the ethics of being-with interactive computer agents. Such investigations are likely to reflect on wider philosophical questions of what it means to be human and computer, and the nature of the relationships that are possible between the two.

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